is a random variable willy mean 600 and variance 100. What is the probabilist the production will be between 800 and 700 over a month?

22. If X and Y are random variables then show that

If E(X + Y) = E(X) + E(Y) if X and Y are independent random variables.

2.1 State and prove Cauchy-Schwartz inequality.

24. Find the lint four moments of the date 4, 5, 5, 1, 4 about menn.

25 A coin is tossed until a head appears. What is the expectation of the number of coases required?

28. The outrability accessly function of a random variable X is given by

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SECTION - D

Answer arry 2 questions out of 4 questions. Good question ourlos 6 marks. (2x6x1

27. Using Gauss-Ellimonthin method to solve the following system of finance

equilitions, indicate whether oversystem is our sapism or his light one companies

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for a second

SB. Diagonalize the matex, 6 -6 12

41 6- 6

29. Briefly explain Stewmars and Kurtonin.

36. Two random variables X and Yingon the dispiral probability density function

 $(a \cdot b) = \nabla a \cdot (a \cdot b) = (b \cdot a)$

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Name: 19 tol notorul nobuditalb svas

First Semester B.Sc. Hon's (Mathematics) Degree (Reg./Supple./Improve.)

(2016 Admission Onwards)

BHM104: MATRICES AND PROBABILITY THEORY

Time: 3 Hours

SECTION - A

Answer any 4 questions out of 5 questions. Each question carries 1 mark. (4×1=4)

- 1. State the distributive law of dot product.
- 2. Find the rank of $\begin{bmatrix} 2 & 3 \\ 4 & 6 \end{bmatrix}$
- 3. State Cauchy-Schwartz inequality.
- 4. What do you mean by Random variables ?
- 5. Define moment generating functions of a random variable.

SECTION - B

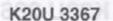
Answer any 6 questions out of 9 questions. Each question carries 2 marks. (6×2=12)

- 6. Find the angle θ between the following vectors x and y: x = [-4, 3], y = [6, -1].
- 7. What do you mean by reduced row echelon form of a matrix? Write an example.
- 8. Define eigenvalue of a square matrix. Find the eigenvalue of $\begin{bmatrix} 2 & 3 \\ 5 & 4 \end{bmatrix}$
- 9. What do you mean by consistent solution of system of linear equations?
- 10. Find the four minors of $\begin{bmatrix} 1 & 5 & 1 \\ 2 & 1 & -7 \\ -1 & 2 & 6 \end{bmatrix}$

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K20U 3367

Max. Marks: 60



- 11. If X is a random variable, prove that $var[x] = E[X^2] [E[X]]^2$.
- 12. Find the cumulative distribution function for the probability function of a random variable X, $f(x) = \begin{cases} 6(x - x^2) & 0 \le x \le 1 \end{cases}$
- 13. Let X has probability distribution function $f(x) = \sqrt{25}$ Find P(1 < x < 3).
- 14. If X is a random variable defined by the probability density function $f(x) = \begin{cases} 3x^2 & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$. Find E(3X - 2).

SECTION - C

Answer any 8 questions out of 12 questions. Each question carries 4 marks.

15. Using Gauss-Jordan Row reduced method to solve the following system of linear equations

$$x - 2y + z - w = 0$$

$$x + y - 2z - 3w = 0$$

$$4x + y - 5z + 8w = 0$$

$$5x - 7y + 2z - w = 0$$
.

- 16. Suppose A and B are row space equivalent matrices. Prove that row space of A equals row space of B.
- 18. Prove that $n \times n$ matrix is non-singular iff $|A| \neq 0$.
- 19. Find the rank of 4 0 2 6
- 20. Briefly explain the method of diagonalization of an $n \times n$ matrix.



- 21. The number of components manufactured in a factory during one month period is a random variable with mean 600 and variance 100. What is the probability that the production will be between 500 and 700 over a month?
- 22. If X and Y are random variables then show that
 - i) E(X + Y) = E(X) + E(Y)
 - ii) E(XY) = E(X)E(Y), if X and Y are independent random variables.
- 23. State and prove Cauchy-Schwartz inequality.
- 24. Find the first four moments of the data 4, 5, 6, 1, 4 about mean.
- 25. A coin is tossed until a head appears. What is the expectation of the number of tosses required?
- 26. The probability density function of a random variable X is given by

$$f(x) = \begin{cases} kx(2-x) & 0 \le x \le 2 \\ 0 & \text{otherwise} \end{cases}. \text{ Find } k, \ \beta_1 \text{ and } \beta_2.$$

SECTION - D

Answer any 2 questions out of 4 questions. Each question carries 6 marks. (2x6=12)

27. Using Gauss-Elimination method to solve the following system of linear equations. Indicate whether the system is consistent or inconsistent. Give complete solution.

$$x + 2y - 5z = -9$$

$$3x - y + 2z = 5$$

$$2x + 3y - z = 3$$

$$4x - 5y + z = -3$$
.

- 28. Diagonalize the matrix 6
- 29. Briefly explain Skewness and Kurtosis.
- 30. Two random variables X and Y have the disjoint probability density function $f(x, y) = Ae^{-(2x+y)}, x, y \ge 0.$
 - i) Evaluate A.
 - ii) Find marginalised probability density functions.